



SEQUENCE LISTING

<110> DRUILHE, PIERRE

<120> GLURP-MSP3 FUSION PROTEIN, IMMUNOGENIC COMPOSITIONS AND
MALARIAL VACCINES CONTAINING IT

<130> 02356.0085

<140> 10/691,672

<141> 2003-10-24

<160> 13

<170> PatentIn Ver. 3.3

<210> 1

<211> 491

<212> PRT

<213> Plasmodium falciparum

<220>

<221> SITE

<222> (1)..(491)

<223> GLURP amino acids 24-514

<400> 1

Lys	Thr	Asn	Thr	Ser	Glu	Asn	Arg	Asn	Lys	Arg	Ile	Gly	Gly	Pro	Lys
1				5					10					15	

Leu	Arg	Gly	Asn	Val	Thr	Ser	Asn	Ile	Lys	Phe	Pro	Ser	Asp	Asn	Lys
			20					25					30		

Gly	Lys	Ile	Ile	Arg	Gly	Ser	Asn	Asp	Lys	Leu	Asn	Lys	Asn	Ser	Glu
		35					40					45			

Asp	Val	Leu	Glu	Gln	Ser	Glu	Lys	Ser	Leu	Val	Ser	Glu	Asn	Val	Pro
	50					55					60				

Ser	Gly	Leu	Asp	Ile	Asp	Asp	Ile	Pro	Lys	Glu	Ser	Ile	Phe	Ile	Gln
65				70						75					80

Glu	Asp	Gln	Glu	Gly	Gln	Thr	His	Ser	Glu	Leu	Asn	Pro	Glu	Thr	Ser
			85						90					95	

Glu	His	Ser	Lys	Asp	Leu	Asn	Asn	Asn	Asp	Ser	Lys	Asn	Glu	Ser	Ser
			100					105					110		

Asp	Ile	Ile	Ser	Val	Asn	Asn	Lys	Ser	Asn	Lys	Val	Gln	Asn	His	Phe
	115						120					125			

Glu	Ser	Leu	Ser	Asp	Leu	Glu	Leu	Leu	Glu	Asn	Ser	Ser	Gln	Asp	Asn
	130					135					140				

Leu	Asp	Lys	Asp	Thr	Ile	Ser	Thr	Glu	Pro	Phe	Pro	Asn	Gln	Lys	His
145					150					155					160

Lys Asp Leu Gln Gln Asp Leu Asn Asp Glu Pro Leu Glu Pro Phe Pro
 165 170 175
 Thr Gln Ile His Lys Asp Tyr Lys Glu Lys Asn Leu Ile Asn Glu Glu
 180 185 190
 Asp Ser Glu Pro Phe Pro Arg Gln Lys His Lys Lys Val Asp Asn His
 195 200 205
 Asn Glu Glu Lys Asn Val Phe His Glu Asn Gly Ser Ala Asn Gly Asn
 210 215 220
 Gln Gly Ser Leu Lys Leu Lys Ser Phe Asp Glu His Leu Lys Asp Glu
 225 230 235 240
 Lys Ile Glu Asn Glu Pro Leu Val His Glu Asn Leu Ser Ile Pro Asn
 245 250 255
 Asp Pro Ile Glu Gln Ile Leu Asn Gln Pro Glu Gln Glu Thr Asn Ile
 260 265 270
 Gln Glu Gln Leu Tyr Asn Glu Lys Gln Asn Val Glu Glu Lys Gln Asn
 275 280 285
 Ser Gln Ile Pro Ser Leu Asp Leu Lys Glu Pro Thr Asn Glu Asp Ile
 290 295 300
 Leu Pro Asn His Asn Pro Leu Glu Asn Ile Lys Gln Ser Glu Ser Glu
 305 310 315 320
 Ile Asn His Val Gln Asp His Ala Leu Pro Lys Glu Asn Ile Ile Asp
 325 330 335
 Lys Leu Asp Asn Gln Lys Glu His Ile Asp Gln Ser Gln His Asn Ile
 340 345 350
 Asn Val Leu Gln Glu Asn Asn Ile Asn Asn His Gln Leu Glu Pro Gln
 355 360 365
 Glu Lys Pro Asn Ile Glu Ser Phe Glu Pro Lys Asn Ile Asp Ser Glu
 370 375 380
 Ile Ile Leu Pro Glu Asn Val Glu Thr Glu Glu Ile Ile Asp Asp Val
 385 390 395 400
 Pro Ser Pro Lys His Ser Asn His Glu Thr Phe Glu Glu Glu Thr Ser
 405 410 415
 Glu Ser Glu His Glu Glu Ala Val Ser Glu Lys Asn Ala His Glu Thr
 420 425 430
 Val Glu His Glu Glu Thr Val Ser Gln Glu Ser Asn Pro Glu Lys Ala
 435 440 445
 Asp Asn Asp Gly Asn Val Ser Gln Asn Ser Asn Asn Glu Leu Asn Glu
 450 455 460

Asn Glu Phe Val Glu Ser Glu Lys Ser Glu His Glu Pro Ala Glu Asn
 465 470 475 480

Glu Glu Ser Ser Leu Glu Glu Gly His His Glu
 485 490

<210> 2

<211> 169

<212> PRT

<213> Plasmodium falciparum

<220>

<221> SITE

<222> (1)..(169)

<223> MSP3 amino acids 212-380

<400> 2

Lys Glu Ala Ser Ser Tyr Asp Tyr Ile Leu Gly Trp Glu Phe Gly Gly
 1 5 10 15

Gly Val Pro Glu His Lys Lys Glu Glu Asn Met Leu Ser His Leu Tyr
 20 25 30

Val Ser Ser Lys Asp Lys Glu Asn Ile Ser Lys Glu Asn Asp Asp Val
 35 40 45

Leu Asp Glu Lys Glu Glu Glu Ala Glu Glu Thr Glu Glu Glu Glu Leu
 50 55 60

Glu Glu Lys Asn Glu Glu Glu Thr Glu Ser Glu Ile Ser Glu Asp Glu
 65 70 75 80

Glu Glu Glu Glu Glu Glu Glu Lys Glu Glu Glu Asn Glu Lys Lys Lys
 85 90 95

Glu Gln Glu Lys Glu Gln Ser Asn Glu Asn Asn Asp Gln Lys Lys Asp
 100 105 110

Met Glu Ala Gln Asn Leu Ile Ser Lys Asn Gln Asn Asn Asn Glu Lys
 115 120 125

Asn Val Lys Glu Ala Ala Glu Ser Ile Met Lys Thr Leu Ala Gly Leu
 130 135 140

Ile Lys Gly Asn Asn Gln Ile Asp Ser Thr Leu Lys Asp Leu Val Glu
 145 150 155 160

Glu Leu Ser Lys Tyr Phe Lys Asn His
 165

<210> 3

<211> 647

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic Peptide

<220>

<221> SITE

<222> (1)..(647)

<223> GLURP MSP3 fusion protein

<400> 3

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Thr Ser Glu Asn Arg Asn Lys Arg Ile Gly Gly Pro Lys Leu Arg Gly
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Asn Val Thr Ser Asn Ile Lys Phe Pro Ser Asp Asn Lys Gly Lys Ile
          20          25          30

Ile Arg Gly Ser Asn Asp Lys Leu Asn Lys Asn Ser Glu Asp Val Leu
 35          40          45

Glu Gln Ser Glu Lys Ser Leu Val Ser Glu Asn Val Pro Ser Gly Leu
 50          55          60

Asp Ile Asp Asp Ile Pro Lys Glu Ser Ile Phe Ile Gln Glu Asp Gln
 65          70          75          80

Glu Gly Gln Thr His Ser Glu Leu Asn Pro Glu Thr Ser Glu His Ser
          85          90          95

Lys Asp Leu Asn Asn Asn Gly Ser Lys Asn Glu Ser Ser Asp Ile Ile
          100          105          110

Ser Glu Asn Asn Lys Ser Asn Lys Val Gln Asn His Phe Glu Ser Leu
          115          120          125

Ser Asp Leu Glu Leu Leu Glu Asn Ser Ser Gln Asp Asn Leu Asp Lys
          130          135          140

Asp Thr Ile Ser Thr Glu Pro Phe Pro Asn Gln Lys His Lys Asp Leu
          145          150          155          160

Gln Gln Asp Leu Asn Asp Glu Pro Leu Glu Pro Phe Pro Thr Gln Ile
          165          170          175

His Lys Asp Tyr Lys Glu Lys Asn Leu Ile Asn Glu Glu Asp Ser Glu
          180          185          190

Pro Phe Pro Arg Gln Lys His Lys Lys Val Asp Asn His Asn Glu Glu
          195          200          205

Lys Asn Val Phe His Glu Asn Gly Ser Ala Asn Gly Asn Gln Gly Ser
          210          215          220

Leu Lys Leu Lys Ser Phe Asp Glu His Leu Lys Asp Glu Lys Ile Glu
          225          230          235          240

Asn Glu Pro Leu Val His Glu Asn Leu Ser Ile Pro Asn Asp Pro Ile
          245          250          255

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Glu Gln Ile Leu Asn Gln Pro Glu Gln Glu Thr Asn Ile Gln Glu Gln
 260 265 270
 Leu Tyr Asn Glu Lys Gln Asn Val Glu Glu Lys Gln Asn Ser Gln Ile
 275 280 285
 Pro Ser Leu Asp Leu Lys Glu Pro Thr Asn Glu Asp Ile Leu Pro Asn
 290 295 300
 His Asn Pro Leu Glu Asn Ile Lys Gln Ser Glu Ser Glu Ile Asn His
 305 310 315 320
 Val Gln Asp His Ala Leu Pro Lys Glu Asn Ile Ile Asp Lys Leu Asp
 325 330 335
 Asn Gln Lys Glu His Ile Asp Gln Ser Gln His Asn Ile Asn Val Leu
 340 345 350
 Gln Glu Asn Asn Ile Asn Asn His Gln Leu Glu Pro Gln Glu Lys Pro
 355 360 365
 Asn Ile Glu Ser Phe Glu Pro Lys Asn Ile Asp Ser Glu Ile Ile Leu
 370 375 380
 Pro Glu Asn Val Glu Thr Glu Glu Ile Ile Asp Asp Val Pro Ser Pro
 385 390 395 400
 Lys His Ser Asn His Glu Thr Phe Glu Glu Glu Thr Ser Glu Ser Glu
 405 410 415
 His Glu Glu Ala Val Ser Glu Lys Asn Ala His Glu Thr Val Glu His
 420 425 430
 Glu Glu Thr Val Ser Gln Glu Ser Asn Pro Glu Lys Ala Asp Asn Asp
 435 440 445
 Gly Asn Val Ser Gln Asn Ser Asn Asn Glu Leu Asn Glu Asn Glu Phe
 450 455 460
 Val Glu Ser Glu Lys Ser Glu His Glu Ala Arg Ser Lys Ala Lys Glu
 465 470 475 480
 Ala Ser Ser Tyr Asp Tyr Ile Leu Gly Trp Glu Phe Gly Gly Gly Val
 485 490 495
 Pro Glu His Lys Lys Glu Glu Asn Met Leu Ser His Leu Tyr Val Ser
 500 505 510
 Ser Lys Asp Lys Glu Asn Ile Ser Lys Glu Asn Asp Asp Val Leu Asp
 515 520 525
 Glu Lys Glu Glu Glu Ala Glu Glu Thr Glu Glu Glu Glu Leu Glu Glu
 530 535 540
 Lys Asn Glu Glu Glu Thr Glu Ser Glu Ile Ser Glu Asp Glu Glu Glu
 545 550 555 560

Glu Glu Glu Glu Glu Lys Glu Glu Glu Asn Glu Lys Lys Lys Glu Gln
565 570 575

Glu Lys Glu Gln Ser Asn Glu Asn Asn Asp Gln Lys Lys Asp Met Glu
580 585 590

Ala Gln Asn Leu Ile Ser Lys Asn Gln Asn Asn Asn Glu Lys Asn Val
595 600 605

Lys Glu Ala Ala Glu Ser Ile Met Lys Thr Leu Ala Gly Leu Ile Lys
610 615 620

Gly Asn Asn Gln Ile Asp Ser Thr Leu Lys Asp Leu Val Glu Glu Leu
625 630 635 640

Ser Lys Tyr Phe Lys Asn His
645

<210> 4

<211> 1941

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
DNA

<400> 4

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aatataaagt tcccatcaga taacaaaggt aaaattataa gaggttcgaa tgataaactt 120
aataaaaact ctgaagatgt tttagaacaa agcgaaaaat cgcttggttc agaaaatggt 180
cctagtggat tagatataga tgatatccct aaagaatcta tttttattca agaagatcaa 240
gaaggtcaaa ctcatctctga attaaatcct gaaacatcag aacatagtaa agatttaaatt 300
aataatgggt caaaaaatga atctagtgtat attatttcag aaaataataa atcaaatata 360
gtacaaaatc attttgaatc attatcagat ttagaattac ttgaaaattc ctcaacaagt 420
aatttagaca aagatacaat ttcaacagaa ccttttccta atcaaaaaaca taaagactta 480
caacaagatt taaatgatga accttttagaa ccctttccta cacaataaca taaagattat 540
aaagaaaaaa atttaataaa tgaagaagat tcagaaccat ttcccagaca aaagcataaa 600
aaggtagaca atcataatga agaaaaaaac gtatttcatg aaaatgggtc tgcaaatgggt 660
aatcaaggaa gtttgaaact taaatcattc gatgaacatt taaaagatga aaaaatagaa 720
aatgaaccac ttgttcatga aaatttatcc ataccaaatg atccaataga acaaatatta 780
aatcaacctg aacaagaaac aaatatccag gaacaattgt ataatgaaaa acaaatggtt 840
gaagaaaaac aaaatttctca aataccttcg ttagatttaa agaaccaac aaatgaagat 900
attttacca atcataatcc attagaaaat ataaaacaaa gtgaatcaga aataaatcat 960
gtacaagatc atgcgctacc aaaagagaat ataatagaca aacttgataa tcaaaaagaa 1020
cacatcgatc aatcacaca taatataaat gtattacaag aaaataacat aaacaatcac 1080
caattagaac ctcaagagaa acctaattatt gaatcgtttg aacctaaaaa tatagattca 1140
gaaattattc ttctgaaaaa tgttgaaaca gaagaaataa tagatgatgt gccttcccct 1200
aaacattcta accatgaaac atttgaagaa gaaacaagtg aatctgaaca tgaagaagcc 1260
gtatctgaaa aaaatgcccc cgaaactgtc gaacatgaag aaactgtgtc tcaagaaagc 1320
aatcctgaaa aagctgataa tgatggaaat gtatctcaaa acagcaacaa cgaattaaat 1380
gaaaatgaat tcgttgaaatc ggaaaaaagc gagcatgaag caagatctaa agcaaaaagaa 1440
gcttctagtt atgattatat tttaggttgg gaatttggag gaggcgttcc agaacacaaa 1500
aaagaagaaa atatgttatc acatttatat gtttcttcaa aggataagga aaatatatct 1560
aaggaaaatg atgatgtatt agatgagaag gaagaagagg cagaagaaac agaagaagaa 1620
gaacttgaag aaaaaaatga agaagaaaca gaatcagaaa taagtgaaga tgaagaagaa 1680
gaagaagaag aagaaaagga agaagaaat gaaaaaaaaa aagaacaaga aaaagaacaa 1740

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agtaatgaaa ataatgatca aaaaaaagat atggaagcac agaatttaat ttctaaaaaac 1800
cagaataata atgagaaaaa cgtaaaagaa gctgctgaaa gcatcatgaa aacttttagct 1860
ggtttaatca agggaaataa tcaaatagat tctaccttaa aagatttagt agaagaatta 1920
tccaaatatt ttaaaaatca t                                     1941

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<210> 5
<211> 27
<212> PRT
<213> Plasmodium falciparum

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<220>
<221> SITE
<222> (1)..(27)
<223> MSP3b

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<400> 5
Ala Lys Glu Ala Ser Ser Tyr Asp Tyr Ile Leu Gly Trp Glu Phe Gly
  1              5              10              15

Gly Gly Val Pro Glu His Lys Lys Glu Glu Asn
          20              25

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<210> 6
<211> 41
<212> PRT
<213> Plasmodium falciparum

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<220>
<221> SITE
<222> (1)..(41)
<223> MSP3d

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<400> 6
Met Leu Ser His Leu Tyr Val Ser Ser Lys Asp Lys Glu Asn Ile Ser
  1              5              10              15

Lys Glu Asn Asp Asp Val Leu Asp Glu Lys Glu Glu Glu Ala Glu Glu
          20              25              30

Thr Glu Glu Glu Glu Leu Glu Glu Lys
          35              40

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<210> 7
<211> 188
<212> PRT
<213> Plasmodium falciparum

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<220>
<221> SITE
<222> (1)..(188)
<223> MSP3a to MSP3f

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<400> 7
Tyr Glu Lys Ala Lys Asn Ala Tyr Gln Lys Ala Asn Gln Ala Val Leu
  1              5              10              15

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Lys Ala Lys Glu Ala Ser Ser Tyr Asp Tyr Ile Leu Gly Trp Glu Phe
 20 25 30
 Gly Gly Gly Val Pro Glu His Lys Lys Glu Glu Asn Met Leu Ser His
 35 40 45
 Leu Tyr Val Ser Ser Lys Asp Lys Glu Asn Ile Ser Lys Glu Asn Asp
 50 55 60
 Asp Val Leu Asp Glu Lys Glu Glu Glu Ala Glu Glu Thr Glu Glu Glu
 65 70 75 80
 Glu Leu Glu Glu Lys Asn Glu Glu Glu Thr Glu Ser Glu Ile Ser Glu
 85 90 95
 Asp Glu Glu Glu Glu Glu Glu Glu Glu Lys Glu Glu Glu Asn Asp
 100 105 110
 Lys Lys Lys Glu Gln Glu Lys Glu Gln Ser Asn Glu Asn Asn Asp Gln
 115 120 125
 Lys Lys Asp Met Glu Ala Gln Asn Leu Ile Ser Lys Asn Gln Asn Asn
 130 135 140
 Asn Glu Lys Asn Val Lys Glu Ala Ala Glu Ser Ile Met Lys Thr Leu
 145 150 155 160
 Ala Gly Leu Ile Lys Gly Asn Asn Gln Ile Asp Ser Thr Leu Lys Asp
 165 170 175
 Leu Val Glu Glu Leu Ser Lys Tyr Phe Lys Asn His
 180 185

<210> 8
 <211> 31
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 Primer

<400> 8
 cccagatcta caagtgagaa tagaaataaa c

31

<210> 9
 <211> 34
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 Primer

<400> 9
cccagatcctt gcttcacgct cgcttttttc cgat 34

<210> 10
<211> 38
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
Primer

<400> 10
aagtagatctt actaatataa gtgagaatag aaataaac 38

<210> 11
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
Primer

<400> 11
gttcagatct ttattcatga tggccttcta gc 32

<210> 12
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
Primer

<400> 12
cccagatcta aagcaaaaga agcttctagt tat 33

<210> 13
<211> 38
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
Primer

<400> 13
attagatctc atttaatgat ttttaaaata tttggata 38